

TULAREMIA

(Rabbit Fever, Deer-Fly Fever, Ohara Disease, Francis Disease)

Report Immediately

✓ DISEASE AND EPIDEMIOLOGY

Clinical Description:

To a great extent, the nature of the illness that occurs with tularemia reflects the route of transmission as well as the virulence of the infecting strain. Almost all cases have a rapid onset of fever and lymphadenopathy (inflamed lymph nodes). Bacteremia (bacteria in the blood), should it develop, may last for two weeks if untreated, and lesions may contain the organism for up to a month. Illness usually falls into one of the following categories:

Glandular	Patients present with one or more enlarged and painful lymph nodes that may become filled with pus.
Oculoglandular	Patients presenting with pus-producing conjunctivitis, enlarged lymph nodes of the neck or near the ears, and usually, fever, chills, and malaise.
Oropharyngeal	After ingestion of bacteria in contaminated food or water, patients present with a painful pharyngitis (with or without ulceration), abdominal pain, diarrhea, and vomiting.
Pneumonic	This form occurs as a primary infection following inhalation of organisms, or secondary to bacteremia; symptoms include non-productive cough, difficulty breathing, and chest pain. Patchy bilateral infiltrates are typically seen on chest x-ray.
Typhoidal	This is a rare form of tularemia, with development of enlarged and inflamed mesenteric lymph nodes, septicemia, abdominal pain (often protracted), diarrhea, vomiting, and gastrointestinal bleeding.
Ulceroglandular	Patients present with large, tender lymph nodes and a non-healing skin ulcer at the site of introduction of the bacteria, often accompanied by fatigue, chills, and malaise.

Type A *F. tularensis* is more virulent; respiratory or ulceroglandular disease may result from contact with very few organisms. Type B organisms cause milder disease and require a higher dose to cause infection.

Causative Agent:

Francisella tularensis, the agent of tularemia, is a gram-negative bacterium. Two types of *F. tularensis* (A and B) occur in the U.S. Type A organisms are classified as *F. tularensis* biovar tularensis, and Type B organisms are classified as *F. tularensis* biovar holarctica.

Differential Diagnosis:

The differential diagnosis includes most chronic febrile illnesses such as plague, brucella, etc.

Laboratory identification:

Tularemia is generally identified via culture of the organism from lesions, blood, or sputum. Serology is also available, but false positives can occur from prior vaccination or cross-reaction with other bacteria.

UPHL: The Utah Public Health Laboratory must provide confirmation of isolates from clinical laboratories. UPHL will forward all isolates to CDC for typing.

Treatment:

Gentamicin and streptomycin are drugs of choice. Treatment with ciprofloxacin has recently shown excellent efficacy. Tetracyclines can also be effective, however, has been associated with higher relapse rates. Treatment with gentamicin and streptomycin should last 10-14 days and tetracyclines for 21 days.

Case fatality:

The case-fatality rate in untreated typhoidal tularemia can be 30–60%. Pulmonary tularemia requires prompt treatment to prevent a fatal outcome. The case-fatality rate of Type A tularemia is 5–15% if untreated, primarily due to typhoidal or pulmonary disease.

Reservoir:

Tularemia is associated most often with wild animals; key reservoirs include rabbits, hares, voles, muskrats, beavers, and other rodents. Certain tick species can also act as a reservoir. Domestic mammals, including livestock and cats, can acquire and spread the disease. Tularemia vectors in the U.S. include certain ticks, deer flies, and horse flies. The common dog tick, *Dermacentor variabilis*, is most often implicated in cases in Utah.

Transmission:

Probably no bacterial agent has more diversified modes of transmission than *F. tularensis*. Infection can occur by:

- Direct contact with an infected animal (e.g., while skinning/dressing wild game, especially rabbits and rodents);
- By arthropod bite (deer flies, horse flies, and ticks);
- By ingestion (e.g., contaminated untreated drinking water, contaminated unpasteurized milk, or contaminated undercooked rabbit or hare meat); or
- By inhalation (following exposure to cats with pulmonary tularemia, infectious aerosols generated while handling animal hides or cleaning areas with dried rodent carcasses, or infectious aerosols generated by winnowing, moving, or

loading contaminated grain). A pneumonic tularemia outbreak on Martha's Vineyard, spanning the summers from 2000–2005, is believed to be associated with inhalation of contaminated particles of dust, soil, or grass generated during outdoor landscaping activities.

- Less commonly, infection may occur by mechanical transmission of the bacteria through bites or scratches of dogs, cats, carnivorous mammals, or birds of prey that have recently killed or fed on infected animals.
- Laboratory infections can also occur; these frequently present as pulmonary or typhoidal tularemia.

Tularemia is generally not directly transmitted from person to person. *F. tularensis* is quite hardy. It survives for weeks to months in cool water or mud, for up to three months in tap water, and for as long as six months in dry straw litter. Frozen (e.g., in rabbit meat), it may remain infective for several years. Concentrations of chlorine attained in routine water purification are very effective at killing *F. tularensis*, as are trace amounts of copper sulfate or zinc.

Susceptibility:

All unimmunized people are susceptible to tularemia.

Incubation period:

The incubation period for tularemia ranges from 1–14 days, but is usually 3–5 days.

Period of communicability:

Tularemia is generally not directly transmitted from person to person. However, drainage from tularemic lesions is potentially infectious, and persons with the pulmonary form of tularemia may possibly aerosolize pathogenic bacteria during the course of their clinical illness. Flies can remain infective for 14 days, and ticks are infective throughout their lifetime. Rabbit meat frozen at 5°F (–15°C) can remain infective for over 3 years.

Epidemiology:

Tularemia occurs throughout North America and in many parts of continental Europe, the former Soviet Union, China, and Japan. Approximately 120 cases of tularemia are reported in the United States annually. Type A *F. tularensis*, found only in the U.S., is common in rabbits (cottontail, jack, and snowshoe) and is frequently transmitted by a tick bite. In North America, Type B *F. tularensis* strains are commonly found in mammals other than rabbits.

Utah sees an average of 2 cases per year that are reported through public health. In Utah, tularemia is usually seen in hunters that do not wear appropriate protection against tick and fly bites, or when they are skinning animals. Tularemia cases are most common during summer and fall months.

✓ PUBLIC HEALTH CONTROL MEASURES

Public health responsibility:

- Investigate all suspect cases of disease and fill out and submit appropriate disease investigation forms.
- Provide education to the general public, clinicians, and first responders regarding disease transmission and prevention.
- Identify clusters or outbreaks of this disease.
- Identify sources of exposure and stop further transmission.
- To assure that cases of disease are not associated with bioterrorism.

Prevention:

Personal Preventive Measures/Education:

There is no vaccine for tularemia available to the general public. The best way to protect oneself is to avoid tick-infested areas or contact with potentially infected animals, and to take precautions when conducting landscaping activities. One may reduce one's risk of tularemia by taking the following preventive measures:

- In areas where contact with ticks cannot be avoided, individuals should take the following precautions:
 - Wear long, light-colored pants tucked into socks or boots, and a long-sleeved shirt.
 - Stay on trails when walking or hiking, and try to avoid areas with tall grass.
 - Use a repellent that contains DEET (the chemical N-N-diethyl-meta-toluamide), and follow the directions on the label. Choose a product that will provide protection for the amount of time spent outdoors. DEET products should not be used on children <2 months of age and should be used in concentrations of 30% or lower for older children and adults. Repellents that contain permethrin can only be applied to clothing, not to exposed skin.
- After spending time in tick-infested areas, individuals should check themselves, their children, and any pets for ticks. Adult dog ticks are about the size of a small watermelon seed. Parts of the body that ticks prefer include the back of the knees, armpits, scalp, groin, and back of the neck. Any attached ticks should be removed using fine-point tweezers. The tick should not be squeezed or twisted, but grasped close to the skin and pulled straight out using steady pressure. (See Section 4C for more information.)
- Avoid any direct contact with wild animals (especially rabbits and rodents), their droppings, or carcasses. Individuals who notice a sick or injured wild animal should call the local animal control officer.
- Minimize rodent and rabbit populations near the home by keeping woodpiles off the ground and in sunny areas, by fencing off any garden areas, by never leaving pet food outside after a pet has eaten, and by securing all garbage in rodent-proof containers.

- Avoid drinking water that may have been contaminated by wild animals, especially rabbits or rodents. If drinking water is received from a well, be sure it is protected from contamination by wild animals.
- Use gloves, an appropriate respirator, and eye protection (e.g., goggles) when skinning or dressing wild animals. Any wild game should be thoroughly cooked before being eaten, and as with other raw meats, steps should be taken to avoid cross-contamination (i.e., hands, utensils, and surfaces should all be thoroughly washed after handling any raw meats or meat products, and the juices from raw meats should not come into contact with any cooked or ready-to-eat foods.)
- Domestic cats and dogs can become infected with tularemia if they come into contact with an infected animal. In rare situations, they may spread tularemia to people. Do not allow pets to roam outdoors unsupervised. If your pets do go outside unsupervised, they should be in a secured yard or kennel. Individuals should speak to their veterinarian if their dog or cat shows any signs of illness, such as fever, loss of appetite, or listlessness.
- Talk to a veterinarian about appropriate tick control measures (tick collars, repellents) to protect pets from ticks and to prevent pets from bringing ticks into the home.

Chemoprophylaxis:

The preferred prophylaxis is doxycycline 100mg PO bid or ciprofloxacin 500mg PO bid X 14d. Generally the only individuals who will be provided with prophylaxis are laboratory workers who have been occupationally exposed.

Vaccine:

There is a vaccine available for at-risk military personnel only.

Isolation and quarantine requirements:

Isolation: None.

Hospital: Body substance precautions.

Quarantine: None.

CASE INVESTIGATION

Reporting:

- All cases and suspect cases of tularemia should be immediately reported to public health.

Case definition:

Tularemia (1999):

Clinical Description

An illness characterized by several distinct forms, including the following:

- Ulceroglandular: cutaneous ulcer with regional lymphadenopathy

- Oculoglandular: conjunctivitis with preauricular lymphadenopathy
- Oropharyngeal: stomatitis or pharyngitis or tonsillitis and cervical lymphadenopathy
- Intestinal: intestinal pain, vomiting, and diarrhea
- Pneumonic: primary pleuropulmonary disease
- Typhoidal: febrile illness without early localizing signs and symptoms

Clinical diagnosis is supported by evidence or history of a tick or deerfly bite, exposure to tissues of a mammalian host of *Francisella tularensis*, or exposure to potentially contaminated water.

Laboratory Criteria

Confirmatory:

- Isolation of *F. tularensis* in a clinical specimen or
- Fourfold or greater change in serum antibody titer to *F. tularensis* antigen

Presumptive:

- Elevated serum antibody titer(s) to *F. tularensis* antigen (without documented fourfold or greater change) in a patient with no history of tularemia vaccination or
- Detection of *F. tularensis* in a clinical specimen by fluorescent assay

Case Classification

Probable: a clinically compatible case with laboratory results indicative of presumptive infection

Confirmed: a clinically compatible case with confirmatory laboratory results

Case Investigation Process:

- Fill out a morbidity form.
- Fill out the investigation form.
- Rule out possibility of bioterrorism.
- Call the laboratory that performed the culture to see whether anyone was occupationally exposed. If so, assure that they receive prophylaxis.
- Make sure that the isolate is forwarded to UPHL for confirmation.
- See whether educational materials are necessary to prevent additional cases.

Outbreaks:

An outbreak will be defined as more than one case of tularemia (in any county) in a 30 day period.

Identification of case contacts:

Tularemia is not transmissible from person to person.

Case contact management:

None.

✓ REFERENCES

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